

NC7ST08

TinyLogic® HST 2-Input AND Gate

General Description

The NC7ST08 is a single 2-Input high performance CMOS AND Gate, with TTL-compatible inputs. Advanced Silicon Gate CMOS fabrication assures high speed and low power circuit operation. ESD protection diodes inherently guard both inputs and output with respect to the V_{CC} and GND rails. High gain circuitry offers high noise immunity and reduced sensitivity to input edge rate. The TTL-compatible inputs facilitate TTL to NMOS/CMOS interfacing. Device performance is similar to MM74HCT but with 1/2 the output current drive of HC/HCT.

Features

- Space saving SOT23 or SC70 5-lead package
- Ultra small MicroPak™ leadless package
- High Speed:
 t_{PD} 6 ns (typ), $V_{CC} = 5V$, $C_L = 15 pF$, $T_A = 25^\circ C$
- Low Quiescent Power, $I_{CC} < 1 \mu A$, $V_{CC} = 5.5V$
- Balanced Output Drive; 2 mA I_{OL} , -2 mA I_{OH}
- TTL-compatible inputs

Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7ST08M5X	MA05B	8S08	5-Lead SOT23, JEDEC MO-178, 1.6mm	3k Units on Tape and Reel
NC7ST08P5X	MAA05A	T08	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel
NC7ST08L6X	MAC06A	NN	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

Logic Symbol

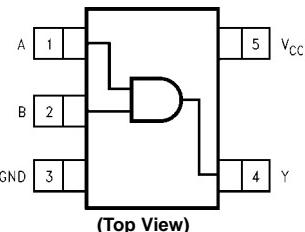


Pin Descriptions

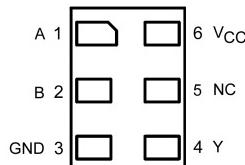
Pin Names	Description
A, B	Inputs
Y	Output
NC	No Connect

Connection Diagrams

Pin Assignments for SC70 and SOT23



Pad Assignment for MicroPak



Function Table

$$Y = AB$$

Inputs		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

H = HIGH Logic Level

L = LOW Logic Level

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NC7ST08

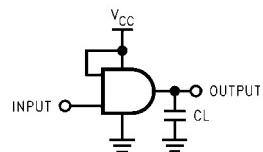
Absolute Maximum Ratings ^(Note 1)				Recommended Operating Conditions ^(Note 2)							
Supply Voltage (V_{CC})		−0.5V to +7.0V		Supply Voltage		4.5V to 5.5V					
DC Input Diode Current (I_{IK})				@ $V_{IN} < -0.5V$	−20 mA	0.0V to V_{CC}					
				@ $V_{IN} \geq V_{CC} + 0.5V$	+20 mA	0V to V_{CC}					
DC Input Voltage (V_{IN})		−0.5V to $V_{CC} + 0.5V$		Operating Temperature (T_A)		−40°C to +85°C					
DC Output Diode Current (I_{OK})				Input Rise and Fall Time (t_r, t_f)		0 ns to 500 ns					
				$V_{CC} = 5.0V$							
				$V_{OUT} < -0.5V$	−20 mA						
				$V_{OUT} > V_{CC} + 0.5V$	+20 mA	Thermal Resistance (θ_{JA})					
Output Voltage (V_{OUT})		−0.5V to $V_{CC} + 0.5V$		SOT23-5		300°C/W					
DC Output Source or Sink Current (I_{OUT})				SC70-5		425°C/W					
DC V_{CC} or Ground Current per Supply Pin (I_{CC} or I_{GND})		±25 mA									
Storage Temperature (T_{STG})		−65°C to +150°C									
Junction Temperature (T_J)		150°C									
Lead Temperature (T_L); (Soldering, 10 seconds)		260°C									
Power Dissipation (P_D) @ +85°C		200 mW									
SOT23-5		150 mW									
SC70-5											
Note 1: Absolute Maximum Ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of circuits outside the databook specifications.											
Note 2: Unused inputs must be held HIGH or LOW. They may not float.											
DC Electrical Characteristics											
Symbol	Parameter	V_{CC} (V)	$T_A = +25^\circ C$		$T_A = 40^\circ C$ to $+85^\circ C$		Units	Conditions			
			Min	Typ	Max	Min			Max		
V_{IH}	HIGH Level Input Voltage	4.5–5.5	2.0		2.0	V					
V_{IL}	LOW Level Input Voltage	4.5–5.5		0.8	0.8	V					
V_{OH}	HIGH Level Output Voltage	4.5 4.5	4.4 4.18	4.5 4.35	4.4 4.13	V	$I_{OH} = -20 \mu A$ $I_{OH} = -2 mA$ $V_{IN} = V_{IH}$				
V_{OL}	LOW Level Output Voltage	4.5 4.5	0 0.10	0.1 0.26	0.1 0.33	V	$I_{OL} = 20 \mu A$ $I_{OL} = 2 mA$ $V_{IN} = V_{IL}$				
I_{IN}	Input Leakage Current	5.5		±0.1	±1.0	V	$0 \leq V_{IN} \leq 5.5V$				
I_{CC}	Quiescent Supply Current	5.5		1.0	10.0	µA	$V_{IN} = V_{CC}$ or GND				
I_{CCT}	I_{CC} per Input	5.5		2.0	2.9	mA	One Input $V_{IN} = 0.5V$ or $2.4V$, Other Input V_{CC} or GND				

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = 40°C to +85°C		Units	Conditions	Figure Number	
			Min	Typ	Max	Min	Max				
t _{PLH} , t _{PHL}	Propagation Delay	5.0	4	12				ns	C _L = 15 pF	Figures 1, 3	
		4.5	6	16		20		ns	C _L = 50 pF		
		5.5	12	27		31					
t _{TLH} , t _{THL}	Output Transition Time	5.0	5	14		18		ns	C _L = 15 pF	Figures 1, 3	
		4.5	11	25		31			C _L = 50 pF		
		5.5	10	21		26					
C _{IN}	Input Capacitance	Open		10				pF			
C _{PD}	Power Dissipation Capacitance	5.0	6					pF	(Note 3)	Figure 2	

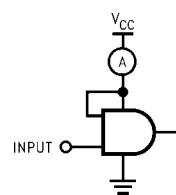
Note 3: C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. (See Figure 2.) C_{PD} is related to I_{CCD} dynamic operating current by the expression:
 $I_{CCD} = (C_{PD}/(V_{CC})(f_{IN}) + (I_{CC\text{static}})$.

AC Loading and Waveforms



C_L includes load and stray capacitance
Input PRR = 1.0 MHz; t_w = 500 ns

FIGURE 1. AC Test Circuit



Input = AC Waveform; PRR = variable; Duty Cycle = 50%
FIGURE 2. I_{CCD} Test Circuit

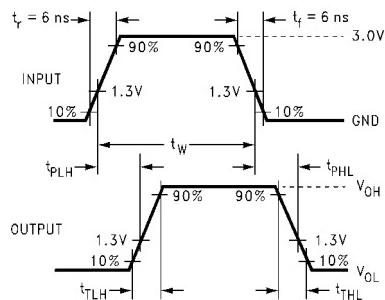


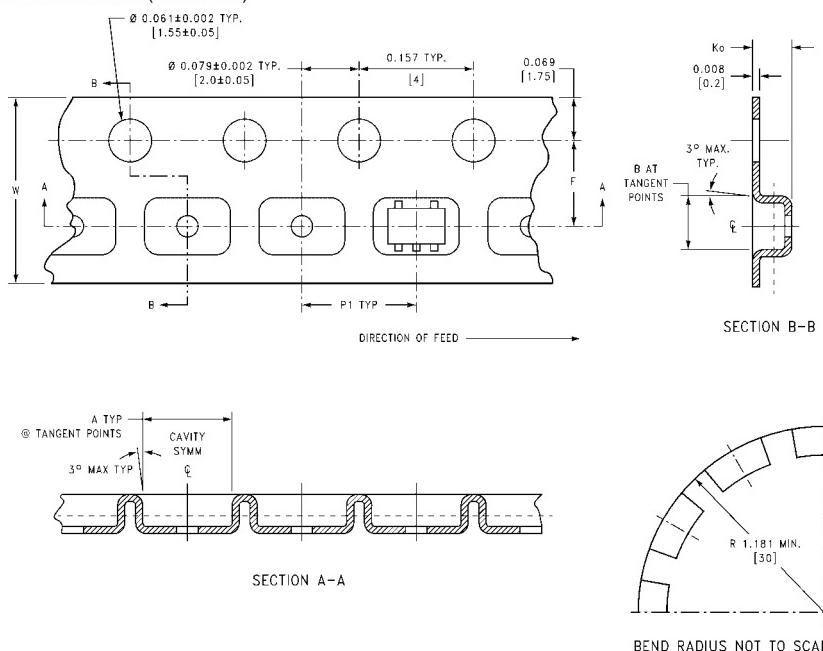
FIGURE 3. AC Waveforms

Tape and Reel Specification

TAPE FORMAT for SC70 and SOT23

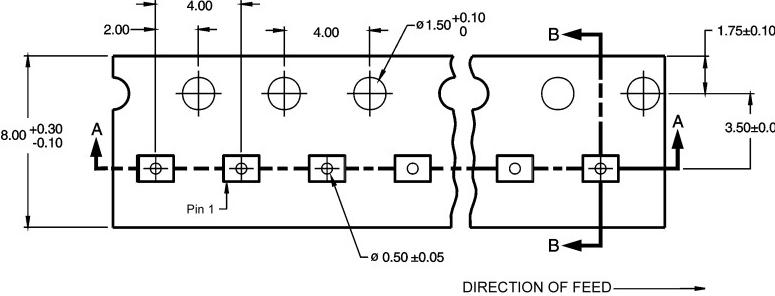
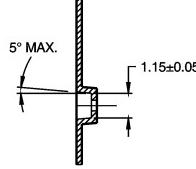
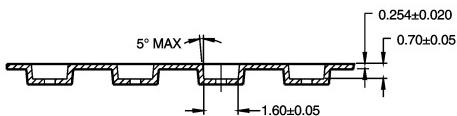
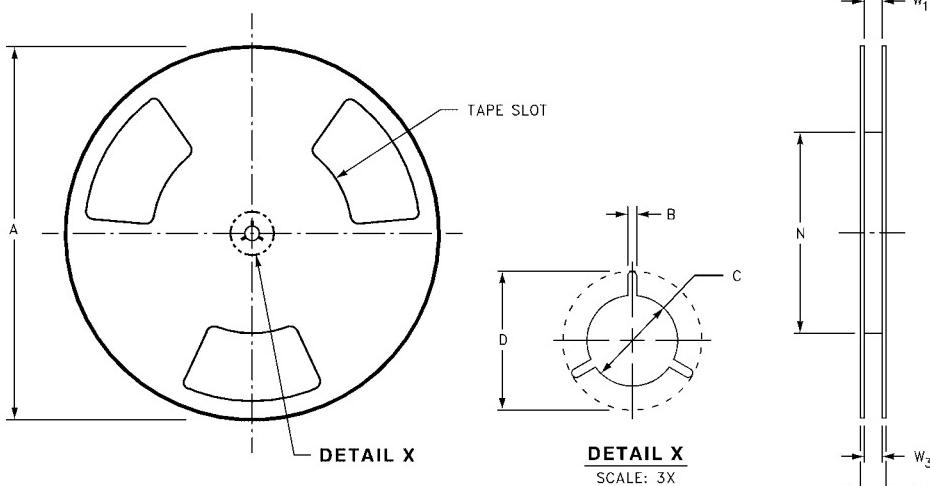
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
M5X, P5X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)



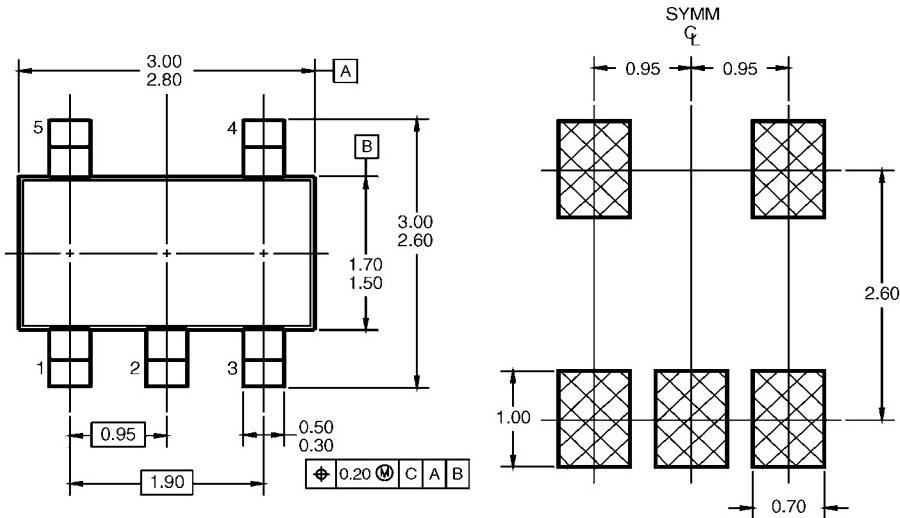
Package	Tape Size	DIM A	DIM B	DIM F	DIM Ko	DIM P1	DIM W
SC70-5	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)
SOT23-5	8 mm	0.130 (3.3)	0.130 (3.3)	0.138 ± 0.002 (3.5 ± 0.05)	0.055 ± 0.004 (1.4 ± 0.11)	0.157 (4)	0.315 ± 0.012 (8 ± 0.3)

Tape and Reel Specification (Continued)
TAPE FORMAT for MircoPak

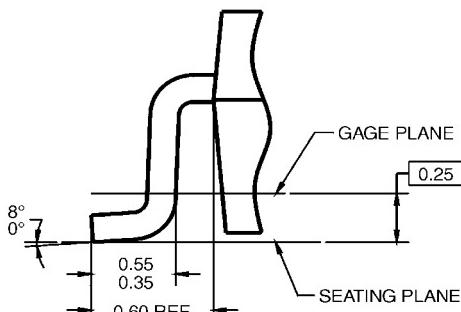
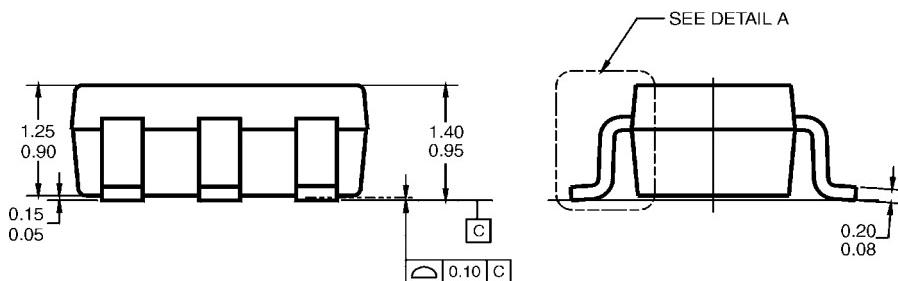
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status				
L6X	Leader (Start End) Carrier Trailer (Hub End)	125 (typ) 5000 75 (typ)	Empty Filled Empty	Sealed Sealed Sealed				
 <p>The diagram shows a top-down view of the tape layout. It features a central carrier section with three cavities, flanked by leader and trailer sections. Key dimensions include a total width of 4.00, a cavity width of $\varnothing 1.50^{+0.10}_0$, a cavity height of 3.50 ± 0.05, and a hub height of 1.75 ± 0.10. A dimension of 0.50 ± 0.05 is shown for the gap between the carrier and the hub. Pin 1 is indicated at the bottom left. Arrows labeled 'A' point to the hub and the carrier section. An arrow labeled 'B' points to the right, indicating the direction of feed.</p>								
 <p>A detailed cross-sectional view of the hub area. It shows a vertical profile with a top thickness of 1.15 ± 0.05 and a side angle of 5° MAX. The scale is 10X.</p>								
 <p>A detailed cross-sectional view of the carrier section. It shows a stepped profile with a top thickness of 0.254 ± 0.020, a shoulder thickness of 0.70 ± 0.05, and a base thickness of -1.60 ± 0.05. The scale is 10X.</p>								
<p>REEL DIMENSIONS inches (millimeters)</p>  <p>The diagram illustrates reel dimensions. The top view shows a circular reel with a diameter A and a central hole of diameter D. The side view shows the reel's height N and the distance from the hub to the tape slot, labeled B. Detail X provides a magnified view of the hub area, showing the slot width C and the overall hub diameter D. The side view is scaled 3X.</p>								
Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	$0.331 + 0.059/-0.000$ $(8.40 + 1.50/-0.00)$	0.567 (14.40)	$W1 + 0.078/-0.039$ $(W1 + 2.00/-1.00)$

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Physical Dimensions inches (millimeters) unless otherwise noted



LAND PATTERN RECOMMENDATION



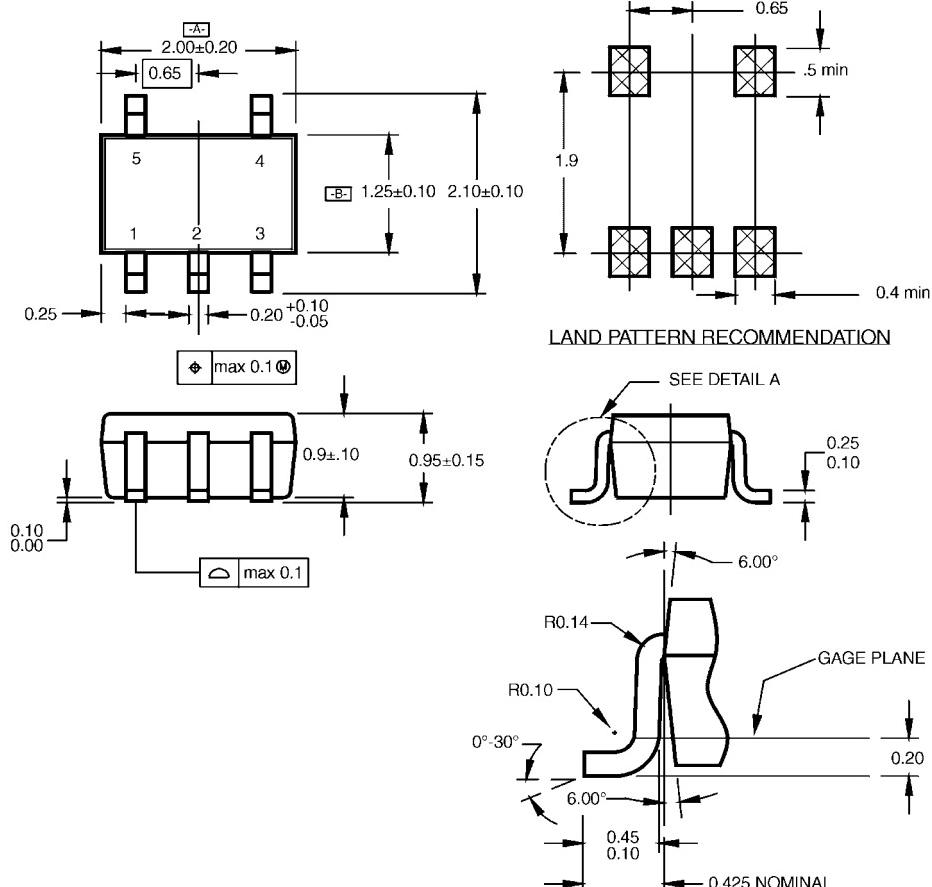
NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC
MO-178, ISSUE B, VARIATION AA,
DATED JANUARY 1999.
B) ALL DIMENSIONS ARE IN MILLIMETERS.

MA05BRevC

DETAIL A

5-Lead SOT23, JEDEC MO-178, 1.6mm
Package Number MA05B

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



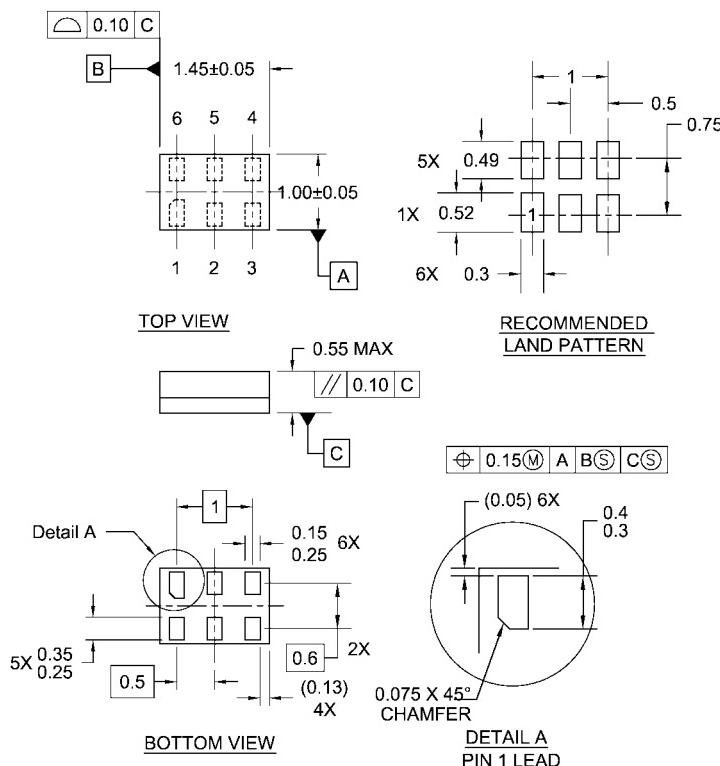
DETAIL A

NOTES:

- A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88A.
- B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- C. DIMENSIONS ARE IN MILLIMETERS.

MAA05ARevC

**5-Lead SC70, EIAJ SC-88a, 1.25mm Wide
Package Number MAA05A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

Notes:

1. JEDEC PACKAGE REGISTRATION IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06ARevB

**6-Lead MicroPak, 1.0mm Wide
Package Number MAC06A**

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